

Fish Gender and Water Temperature

Would rising global temperatures adversely impact breeding biology in fish?

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Posted: January 5, 2009, 5 p.m. EST

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Apistogramma cacatuoides courtesy Fanch The System !!! Scientists are looking into the impact of possible rising global temperatures on a number of species of fish because of their breeding biology. In most fish, as in mammals, their gender is determined by the presence of a pair of sex chromosomes present in each cell of their bodies. External environmental factors normally have no impact on their gender.

In the case of some species however, it is now clear that the temperature is the crucial factor which controls the gender of their young. Known as temperature-dependent sex determination (TSD), this method of reproduction is most commonly associated with reptiles, such as certain turtles which lack sex chromosomes, but rare in fish.

Research published in the journal *Life Science* by Natalia Ospina-Alvarez and Francesc Piferrer from the Marine Science Institute in Barcelona, Spain has revealed that fewer fish than previously thought are actually affected by their environmental temperature when breeding. Fourteen out of the 20 genera which were suspected of displaying TSD actually have sex chromosomes and only at abnormally high water temperatures in the laboratory were biological females transformed into males during their development.

Out of the remaining six genera in the study, the results confirmed that their breeding results are naturally temperature-sensitive. This means that the possible rise in water temperature by the end of the century is likely to skew their populations, resulting in an increased number of male fish. Depending on the species, the sex ratio of males in the population relative to females may increase from 50 percent to anywhere between 75 percent and 98 percent. This leaves them at risk of becoming extinct simply because not enough females will survive to breed.

Fish identified as being within the TSD category include the South American dwarf cichlids belonging to the *Apistogramma* genus, such as the cockatoo dwarf cichlid (*A. cacatuoides*) which is a popular aquarium species. There are doubtless many others whose breeding biology may also fit into this group, and they could therefore be under threat as well. But at present, the influence of TSD has only been studied in about 5,000 of the world's 33,000 species of fish.